THE STEPS AND PRACTICAL ACTION AND FRAMEWORK OF EMPATHIC DESIGN

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Abstract: Empathic design is an emerging issue when conceptual design becomes more important. Basically, it is a user-centered design approach that pays attention to users’ feelings, and through this approach with appropriate skill, designers may go close to understand what users’ real needs are and create new design, commodity and circumstance to meet various personal or social requirements. It is very crucial for designers to put himself/herself into another’s shoes and that is, they must be capable of sharing and understanding users’ emotions and feelings in order to find out their potential needs. The research methods adopted are literature review and case studies selected from literature. From this study, we can conclude that there are basic structures for empathic design, which are the third stages and the seven steps. The three stages are identification of problems, solutions by design and evaluation to design, and the seven steps are “Walking into the field”, “Careful observation”, “Development of ideas”, “Affective & cognitive resonance”, “Visualization of ideas”, “Commercialization”, and “Evaluation of design”.

Keywords: Empathy; Empathic Design; Design Framework; User Experience

1. Introduction

Nowadays, customers’ behaviors are deeply influenced by emotion and spirit. Customers always crave for updated products and services to solve their daily problems. Thus, “the awareness of the customers’ latent need” becomes an important factor for modern design.

The main idea of “Empathic design” is to identify customers’ latent needs in order to design new products or provide services. The traditional ways to understand customers’ needs such as gathering information through questionnaires and focused groups are not easy to discover their latent needs. On the other hand, the participatory design which observes customers’ behaviors and reactions in a laboratory may cause contraction for those who cannot show their personalities under the pressure of being observed. As a result, designers still have difficulties in understanding customers’ preferences in order to figure out their needs.

Empathic design is an emerging field. Daniel H. Pink (2005) [1] mentioned that the people who have strong right brain qualities, which is also called six senses (design, story, symphony, empathy, play and meaning), will have more . Artists, inventors, designers, master storytellers, caregivers, consultants and others with a macro-view will be very popular in the job market. For example, people with the sense of “story” are more able to empathize with the plots, actions or characters in dramas or fictions. This concept can also be applied onto design to understand the latent meaning of a design ([1], p.188).

With the ability of empathy, a designer can put himself/herself into the customers’ shoes. Empathy also relates to the integration process since a designer with empathy can immerse in the customers’ lives and environments and understand their overall demands.

Empathic design, considered as the human-centered, user-centered, and consumer-centered design, focuses on the exploration of human nature and the anticipation of consumers’ need.
The objectives of this study are to analyze and compare the steps and practical actions from different researchers and their cases, then found out the suggest-worthy steps, actions and framework of empathic design.

2. Research Methods

This study adapts qualitative research to discuss the meaning and phenomenon of empathic designs. Compared with quantitative research (select samples to represent whole populations), qualitative research provides sufficient contextual information about the case, including relevant biographical and social information.

Literature review and case studies selected from literature are employed in the study. This is a meta-analysis study in the qualitative method. By exploring empathy phenomenon and three empathic design cases analyses, this research generalizes an empathic design framework.


3. Literature Review

Articles about empathy, empathic design, design methods, customers’ experiences and design radar are discussed in the study.

3.1. Empathy as intermediary

Empathy is an imaginative projection into another’s feelings and a state of fully identification with another’s situation, condition and thoughts. Empathy is also the most essential and crucial sense and is also considered as the basic sense to generate the other five senses of human.

In 1997, two empathic inferences articulated pointed out subject of accuracy and the weaknesses of insight into the subjective experiences of others. Empathic accuracy is a skill to assess or measure one’s social intelligence accurately, and the weakness of insight means the difficult to fully understand others’ feeling. [5]

In 2004 Feng, Lazar, & Preece discussed the relationship between empathic accuracy, response type and online interpersonal trust, and found that both empathic accuracy (similarity) and response type (supportive and helpful) have significant influence on online interpersonal trust. They also pointed out that people are more sensitive to message consistency and trust the others who have joined the web with similar scenario. [6]

In the book of “Emotionally Durable Design”, Chapman(2005) provided the idea that the Empathic design, like the food which has the expire date, has the time limit and that is the reason why users do not use products that still work. The emotionally durable design directly relates to the empathic durability relationship between the customers and products. [7]

In short, the framework of empathy can be applied to three areas: research activities, communication activities and ideation activities. [8] Koskinen & Battarbee suggested that the best place for empathic methods is “the early, conceptual part of product development process.” [9]

3.2. Empathic design as design methods and techniques

In earlier times, empathic design had been regarded as one of ten feasible methods for developing a product. Kleef, Trijp & Luning considered empathic design as “a form of observational research in which consumers are watched using products in their own environment.” ([3], p.192)

How to integrate consumers’ experiences and interactions with new prototypes serves as a crucial factor for success in business. However, this step is often ignored or creates difficulties in effective execution. The possible reason is that survey researchers are unfamiliar with research techniques and thus use terms and thesis topics that normal viewers find hard to understand. Thus, empathic design is a new research technique and not used by many companies.

There are some empathic design techniques developed to promote empathy and help designers apply the user experience to design, such as storytelling, storyboards, personas, scenarios, and role-playing. [10-14] Basically, these techniques make designers or researchers realize user behavior and experience by ‘simulating the user’s condition,’ ‘product handling,’ ‘experience prototyping,’ ‘body storming’ and ‘informance.’ [10]

Tim Brown (2008) [15], the CEO of IDEO design company, at the 2008 Serious Play Conference talked about their designer, Kristian Simtsarian, who had an experience as a patient in an emergency room. Another designer, Altay Sendil, had a laser surgery on his chest and could feel the chronic pain suffered by other patients, including removal of the wound dressing patch. These simulation experiences are so-called role playing. It is a kind of experience and this form of learning can be used to gather customers’ feedback on designs.

Stepping into users’ conditions is supposed to be the
best way of understanding users, and the process of moving in and out of users’ experiences can be divided into four steps of discovery, immersion, connection and detachment. (See Fig. 1.) [8]

In 1997, Leonard & Raport [2] noted the uncertainty of customer requirements and proposed five design steps to meet customers’ actual needs. The five steps are observation, capturing data, reflection & analysis, brainstorming for solutions and developing prototypes of possible solutions.

3.3. User experience

Empathic design focus on understanding relevant experiences that result from interactions between products, users and researchers. That is, designers should conduct situated research based on the user experiences. The key factor of empathic design is near to completely understand users’ reactions, experiences and feelings after they use the product under certain environment. [9]

The initial framework about experience in a meaningful way to designers was divided into four dimensions of sub-consciousness, cognition, narrative, and storytelling. [16] (See Fig. 2.) Meta-experiences have been affected by thinking, discussing, storytelling and other forms of activities. Eventually, with the construction process, science and art can be reinvented in innovative ways.

Battarbee & Koskinen had proposed co-design and users’ co-experience that symbolic interactionism could create a more inclusive and integrated structure for thinking about user experiences. [17] Empathy is an important component to create a true understanding of users’ experiences as design sources. [18] A typical challenge is how to transmit the feeling of empathy acquired by user studies to designers who have not participated in the user study. There was a case study of creating Suomenlinna experiential presentation using repetitive narratives. It consisted of three phases: intellectual introduction, quiet walk and personal experience. [18] (See Fig. 3.)

3.4. The radar of design

The key to emphatic design is an understanding of how people use, see, experience, and feel their interactions with objects, environment and services. Therefore, as a design tool, empathy has to be translated into appropriate methods. Koskinen & Battarbee provided a bird’s eye view with nine cells for the methods used by designers to understand the inner world of the user. The most empathic practices in design are cells 9- at the lower right in figure 4. ([16], p.45) In the Designer’s Radar cells 1-3, ‘Imagined’ means “Design has been based on imagined users in imagined circumstances.” ([16], p.46) Cells 4-6 ‘Represented’ means

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**Figure 1.** The four steps of moving in and out of users’ experience (remapped from Kouprie & Visser, p.445 [8])

**Figure 2.** An initial framework of experience as it relates to interaction design (Remapped based on Forlizzi & Ford, p.421 [16])

**Figure 3.** The experiential presentation using repetitive narratives (referred to Fritsch, et al [18])
"User represented in real situations." ([16], p.46) In this level, designer team methods (ex. the scenario development of products) and brainstorming techniques (ex. Role Playing) could be useful.

In the final cells 7-9, ‘Experienced’ means “Real users in real circumstances” ([16], p.46) Cells 7-9 use ethnographic researches for observation and interviews to get closer to users. Cells 8-9 let designer participate in users’ place to use a certain ‘magic thing’ or to know how people use prototypes of future products by video-based observations. Cells 9- designers opt for role immersion, so “They create an understanding of the users’ world by entering it "as a user" rather than being just an observer...Empathic understanding is key to design, not data as such.” ([16], p.47) (See Fig. 4.)

3.5. A summary of literature review

The issue of empathic design has been discussed in research literature for the past few years, and empathy has been used as a useful technique to understand users’ real needs. There are at least six points of view from the past literature review: 1) Empathy is an intermediary to understand users; 2) Empathic design is a design method to help promote empathy through the techniques like brainstorming, narratives and storytelling; etc. ; 3) Co-design and co-experience are helpful to understanding users’ experience; 4) A framework of user experience can be divided into four dimensions of sub-consciousness, cognition, narrative, and storytelling; 5) The radar of design indicates the designers’ lever to empathy; and 6) furthermore, empathic design can be used to explore more new products in the design field and applied to real design processes.

As we understood from those literature reviews that empathic design had different design processes and steps, it worked for multiple design methods as well and different techniques could be used.

4. Case Studies Selected From Literature

According to the previous review of literature and case studies, some scholars have researched and analyzed the concept of empathic design with a variety of research methods. We selected three papers for further study including “Spark Innovation through Empathic Design,” [2] “Consumer research in the early stages of new product development: A critical review of methods and techniques,” [3] and “The art of innovation” [4]. These three articles focus on empathic design with detailed techniques and examples. In this study, we analyzed three cases selected from the above literatures to generalize the concept and steps of empathic design.

4.1. Case 1: A microsurgery and visual devices

1) Steps of empathic design

Leonard & Raport (1997) [2] mentioned that if people wanted to gain business success with new products or services, they had to find ways to show end-users’ internal knowledge and then fulfill their unarticulated needs. Thus, they came up with empathic design techniques with five steps: observation, capturing data, reflection and analysis, brainstorming for solutions, and developing prototypes of possible. They asked the questions about how a company identified those requirements that consumers themselves do not even know, and how designers learned about different pre-design techniques that have been used to find out customers’ true needs. (See table 2)

2) Practical action in each step of empathic design

(See table 2)

Step 1: Observation

Based on the principle of observation, designers need to see how customers use and interact with products; for example, environmental conditions around consumers or
daily routines. In this case, a product developer in Hewlett Packard observed the surgeon was demonstrating a complicated surgery by watching the screen and using a knife.

**Steps 2: Capturing data**

Using the empathic design techniques, designers and researchers can analyze and apply information gleaned from observations in field survey like anthropologists do.

Top engineering/design companies such as Apple, Motorola and Intel have inducted anthropologists and empathic design. Their goal is that by hiring these anthropologists, they can help researches on relevant information and data about target consumers whether through face-to-face interviews, via camera shooting, using photography or video tools. In this case, if anyone moved during the operation, the field of vision between the surgeon and the screen would be blocked immediately; however, the surgeon didn’t make any complaints.

**Step 3: Reflection and analysis**

The team members returned to reflect on what they have observed and to review their visual data with other colleagues. The team tries to identify all of its customers’ possible problems and needs. In this case, the field vision of the monitor was hindered once a while.

**Step 4: Brainstorming for Solutions**

Traditional research usually uses pre-designed inquires or documents to present their design ideas, but empathic designers are capable of using tools for visual expression and creating cross-group interactions between members by brainstorming meetings. Brainstorming is a valuable part of any innovation or empathic design process; it is used specifically to transform the observations into graphic, visual representations of possible solutions. In this case, the product developer hit upon an idea of video helmets that not only can prevent the screen from blocking but also enhance the operational accuracy for surgeons in a substantial way.

**Step 5: Developing prototypes of possible**

Just as researchers gather useful visual data, designers can stimulate communication by creating some physical representations of a new concept for a product or service. Prototypes are a critical part of the empathic design process for at least three reasons: (1) to clarify the concept of the new product or service for the development team, (2) to enable the team to express the concept in front of other individuals who work in functions and not formally represented by the team. (3) to stimulate responses and to foster discussions with potential customers of the innovation for concreteness. ([2], pp.108-113)

4.2. Case 2: Redesign of Cereal’s packages

1) Steps of empathic design

Empathic design had been regarded as one of ten methods for research and product development. How to integrate consumers’ experiences and interactions with new prototypes serves as a crucial factor in a successful business model. However, this step is often ignored or creates difficulties in effective execution. Empathic design is mainly used to explore the benefits consumers intend to obtain from the products. Sometimes consumers do not know their real requirements since they have already been adapted to their surroundings. Observers may observe the hidden requirements around the consumers by clues of frustration resulted from use of a product or in a certain circumstance, doubts about the product or use not as expected. To transform consumers’ demands into the ideas for new products, observers are required to be the people who understand potential techniques in empathic design as if product developers should be engineers or designers themselves [19]. Information on empathy is usually collected in the form of photos or films.

The possible reason is that survey researchers are unfamiliar with the research techniques and thus use terms and thesis topics that normal viewers find hard to understand. The consumer research method of product development can be divided into four stages: 1) opportunity identification – (a) understanding consumer needs methods, (b) creativity enhancement techniques, (c) screening techniques, 2) development (planning tools), 3) optimization (product testing), 4) launch. [3] Empathic
design has been classified as “Opportunity Identification” on the first stage. Empathic design includes the theory of anthropology and the analysis of tacit knowledge. (See table 3.)

2) Practical action in each step of empathic design
(See table 3)

Step 1: Opportunity identification
The goal of this stage are looking for new areas of opportunities. Fount out the consumers unmet needs and wants. Leonard (1995) [19] gave an example of developing a cereal product for breakfast. Adding cereal into milk was considered as a way of pacifying kids. Although consumers didn’t complain or ask for another new product; however, the product developer found a problem. He discovered small packages were easier to put in a handbag.

Step 2: Development
Thus, a new oatmeal package for little kids was developed. Cheerios also found that not all families with little kids desired to have traditional oatmeal for breakfast. This paper did not showed any planning tools to development.

Step 3: Optimization
Cheerios product developer found out little children were more unstable and had different mealtime, and parents would prefer small packages of cereal for their kids to have oatmeal at any time in any place. The big packages were not easier than the small packages to use and carry out, but the previous paper did not motion any product testing.

Step 4: Launch
Finally the new product development process will be launched to the market. It is important that a successful new product development will depend on the quality of the opportunity identification stage.

4.3. Case 3: IDEO redesigned the shopping cart
1) Steps of empathic design
The design company IDEO has explained that it incorporated innovation and originality into the corporate culture in a natural way by (1) establishing an innovative and original culture, (2) enjoying work, (3) innovative mentality, (4) feeling indebted as if it were received in person, (5) originality brainstorming meetings, (6) passions of the innovative design team, and (7) creating innovative spaces. [4] IDEO put these seven critical ideas into practice to keep its core competence of innovation. The design process is the main reason for continuous innovations in IDEO.

Tom Kelley, General Manager of IDEO, indicated in his book “The Ten Faces of Innovation” that one important competence was empathy.

In 2001, ABC News/Nightline filmed the whole process and named it “Watch the birth of innovation with your own eyes.” IDEO was thus invited to perform how to improve a certain product in the program and Nightline videotaped the whole process.

The shopping cart that everyone is used to was redesigned in five days and the five basic steps of redesign are explained as follows: ([4], pp.6-7) (1). Identifying problems: to identify the market, customers, techniques and the problems themselves; (2). Observing life: to observe the situations in people’s real lives and find out the root causes that result in such situations; (3). Design and visualization of users: to visualize brand-new concepts and the potential users of these concept products; (4). Evaluation and improvement of prototypes: continuous evaluations and improvements of prototypes; and (5). Execution of commercialization and to market: to execute commercialization of new concepts and to market it; it is found the main problem with the customers is to actually observe product users or potential users of developing products and these subtle observations are the sources for innovations. (See Table 4).

2) Practical action in each step of empathic design
(See table 4)

Step 1: Identifying problems
A shopping cart, an old and common product to people, was redesigned in five days. Peter Skillman of IDEO was the man in charge of this task and grouped several teams to observe consumers’ behavior of shopping groceries and to study the shopping cart and other related skills.

Step 2: Observing life
Two stages of cognition and observation were completed on the first day and experts and local people
were consulted as well. Observations of people's shopping behavior in the shopping center revealed problems including safety of little kids, shopping stagers using shopping carts as their base for shopping, shoppers were forced to lift up the rear wheels of the shopping carts to slide over the people in front or let others go first, a high rate of stolen shopping carts. Three objectives were concluded, which were a shopping cart that gave consideration to the children, planning for more efficient shopping methods and enhancement of safety.

Step 3: Design and visualization of users

On the second day, a brainstorming meeting was convened for more ideas. The coolest ideas were elected by ballot, and responsible personnel of all teams sifted the ballot result and made a prompt decision for model production. Then, four groups were divided to build a substantial model in three hours and responsible for different jobs, including shopping with a shopping cart, safety, paying up and locating the things desired. Four prototype shopping carts with respective characteristics were produced after three hours.

Step 4: Evaluation and improvement of prototypes

The features of the prototypes included new appearance, a basket that could be placed on the cart frame, with a microphone and a scanner that saved waiting time at the cashier. Improvements of prototype of shopping carts continued including the modularization, consideration of children safety and a convenient space to put things in.

Step 5: Execution of commercialization and to market

On the third day, senior welders of IDEO constructed a well shaped framework and improved the wheels. On the fourth day, it was found improvement of the basket. On the fifth day, a new shopping cart was displayed in the program.

It had an open frame design with upper and lower decks of five standardized baskets ([4], pp.8-13).

5. Results and Discussions

The key to empathic design is to discover the potential needs of users and develop products of new concepts. Consequently, empathic design is defined as a series of design processes to have an in-depth understanding of users' potential requirements and observation of users' behavior with diversified approaches. In this way, the real needs of users can be discovered and new products that meet users' requirements can be developed and produced.

5.1. Process of empathy observation

The process of empathy observation can be classified from different angles as follows:

1) Designer's empathy: A designer should observe the circumstances, services and products for users on the spot to understand and develop empathy. Then, the designer can place himself in users' position to find out the problems and try to satisfy the real demands of users. As a result, users' potential needs can be discovered by empathy resulted from the following situations: (a) designer's own life and design experiences, (b) personal experience and participation in observations of users' daily lives, (c) being indulged in imaginations and applications of five senses, (d) involvement of other related information.

2) Internal communication of empathy in an organization: Designers use visual ways to retrieve the observation data of users and discuss and communicate with internal personnel involved. As a result, how to develop empathy for participant designers towards users without site observations and to meet the real needs of users is the workflow of empathy which can be divided as: (a) communication of empathy with the coordinate design team,
(b) communication of empathy among departments, and (c) innovative design methods for empathy.

3) Users' empathy: A designer applies originality and cultures as the elements and utilizes technology and service as a dynamic energy to observe the needs that users themselves have not discovered yet with innovative eyes. A design that can touch the hearts of users is a design with an overall experience process that takes the product, service, field and technology into consideration.

5.2. Relationship of empathic design process

"Identification of problems", "solutions of design" and "evaluation of design" are a designer's obligations towards product design and the above three points are also essential stages for the designing process.

The first stage is the identification of problems: extract feasible information through keen observations and at the same time, use the designing method focusing on empathy to find out possible problems (such as designer's personal experiences, role-playing simulation of a consumer's behavior and so on). Therefore, empathic design can find out and identify users' potential needs. Consequently, the first step of the design process is "Walking into the filed," the second step "Careful observation" and the third step "Affective resonance & cognitive resonance."

By doing so, designers can move to the second stage, solutions of design: "Development of ideas", "Visualization of ideas" and "Commercialization" during the designing process. There are different levels and purposes to be implemented in empathic design. "Development of ideas" means integrating empathy into design and is used to explore creative concepts; "Visualization of ideas" refers to turning abstract concepts into products that appeal to all five senses of users; "Commercialization" stands for carrying out the detailed design of a product such as prototyping and all the specific implementation details should be considered. It is important for designers to know how to incorporate empathy with products, services and environment experiences for users.

The third stage is evaluation of design: designers now have to make evaluations of weaknesses and strengths of a product and treat them as a crucial reference for modifications and try to make things better. Testing and reflecting over a design are the basic thinking about a daily life. (See Fig. 5.)

5.3. The Framework of Empathic Design

Analysis of the framework of empathic design is as follows:

1) Walking into the field: The local real condition is understood directly on the spot. The new teaching model of field surveys consists of short terms, proximity and no need to learn indigenous languages. The characteristic teaching method of "Walking in, solution out and practice" helps students to get in touch with the society and develop their knowledge of local cultures and customs and competence of communicating with the society. (Hiroshi, 2008) [20]

2) Careful observation: During the pre-design process, designers are engaged in observing users' actions, communicating ideas, assessing empathy accuracy, finding out unarticulated requirements and realizing design limitations. Through a series of various tactics such as role playing to experience users' lives, or storytelling to present designing ideas, designers can become immersed in the lives and environments of users in order to better understand overall demands for innovative designs.

3) Affective & cognitive resonance: There are two components of empathy from the psychological point of view: one is the affective component and the other is the cognitive component. For example, some designers try to feel (affective) and understand (cognitive) users before design. Creating balance between the affective resonance and cognitive reasoning of users is also one of the empathy issues. [9] In another words, designers need to be creative to incorporate empathy into their designs. Some empathic design techniques had been discussed like storytelling techniques, storyboards, personas, scenarios and role-playing and they can be used to help designers develop and apply user experiences to designs.

4) Development of ideas: after removing design obstacles, designers conceptualize their solutions by making illustrations of words or photos. Designers need to convert this tacit knowledge into abstract or imagery concepts and
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then visualize their ideas to communicate with users. For example, brainstorming of cross-domain collaboration, creative thinking and innovative discussions are also essential methods.

5) **Visualization of ideas**: Visualization can enrich designers' visual context of design concepts. It is like storytellers presenting their works with lively descriptions, full of creativity and imagination. It is also like stimulating users through their five senses to experience innovative products, services or environments. Other methods that can be applied are like using a moon board, stylish board, construction scene, photo image and so on to collect necessary information.

6) **Commercialization**: After visualization, designers are required to develop their possible prototypes through data analysis, prototype testing and application of ethnography and investigation of user meta-experiences. Design details can determine the values of products, so an optimized design can satisfy users' requirements bringing them closer to products, accordingly.

7) **Evaluation of design**: Besides the feedback from prototype samples, designers need to provide some finished products for users' re-confirmation to see if there are any modifications needed.

Integrating the seven steps of empathic design with the design process and complying with the principles of seven steps in three stages, the structural model of empathic design is shown in Fig. 6.

6. **Conclusions**

According to the above analysis, empathic design can be summarized and classified from different perspectives as below:

1) An observation can be in-depth or shallow. The more one indulges in the real situation, the more in-depth observation he can get as shown in "Designer's Radar".

2) The process of empathy observation can be classified into three kinds that are designer's empathy, internal communication of empathy in an organization and users' empathy.

3) There are many methods used for field survey and careful observation in the empathic design process include walking into the field, observing users' actions, application of ethnography, investigation of users' meta-experiences, role-playing, film the process of use with a video recorder, storytelling, prototype testing and so on.

4) Specialists in sociology and anthropology are invited to observe users because they are capable of getting a deeper observation and understanding of the behavior and tacit knowledge of the users.

5) Generating the steps and practical actions of three previous cases, a framework of empathic design can be structured with three stages and seven steps as figure 6.

6) The three stages of empathic design include identification of problems, solutions of design and evaluation of design.

7) The seven steps of empathic design include walking into the field, careful observation, affective & cognitive resonance, development of ideas, commercialization and evaluation of design.

8) Empathy is required as a tool for the seven steps of empathic design for a deeper understanding, and the techniques of empathic design need to be created in different case.

7. **References**

